OPERATION and SERVICE MANUAL

TSC - 810

SIGNAL CONDITIONER

·analog
·event
·ana-vent
·militarized
·oem building blocks

·recorders

gulton®

Measurement & Control Systems Division

Gulton Industries Inc., East Greenwich, Rhode Island 02818

401-884-6800 • TWX 710-387-1500

FOR
MEDICAL
MILITARY
GEOLOGICAL
INDUSTRIAL
APPLICATIONS

OPERATION and SERVICE MANUAL

TSC - 810

SIGNAL CONDITIONER

Measurement & Control Systems Division
Gulton Industrial Park
East Greenwich, Rhode Island 02818

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WARRANTY

Gulton warrants each instrument to be free from defects in material and workmanship. Our liability under this warranty is limited to servicing or adjusting any instrument returned to the factory for that purpose, and replacing any defective parts thereof (except pens, tubes, fuses, and batteries). This warranty is effective for one year after delivery to the original purchaser, if the instrument is returned, transportation charges prepaid by the original purchaser, and upon our examination, proves to be defective. If the defect has been caused by misuse or abnormal conditions of operation, repairs will be billed at our current rate. In this case, an estimate will be submitted before the work is started. This warranty is in lieu of all other warranties, expressed or implied.

TABLE OF CONTENTS

		Page
I.	Description of Equipment	I-1
II.	Installation	II-1
III.	Operation	III-1
IV.	Principles of Operation	IV-1
V.	Preventive Maintenance	V-1
VI.	Troubleshooting	VI-1
VII.	Parts List	VII-1
VIII.	Schematics & Illustrations	VIII-1
IX.	Accessories	IX-1

LIST OF ILLUSTRATIONS

	DWG. #
Assembly, Input Circuit	401127
Schematic, Input Circuit	401130
Assembly, Input Circuit Module	401134
Schematic, Buffer Amplifier	401132

I. DESCRIPTION OF EQUIPMENT

A. Introduction

The Model TSC-810 Signal Conditioner Module can be used interchangeably with the TR-888, TR-444, and TR-7100 model recorders. The TSC-810 accepts AC and DC signals up to 200 volts full scale.

The TSC-810 front panel controls include:

1. Gain Control--The gain control is a potentiometer across the output of the buffer amplifier which controls the amount of signal to the pen motor.
2. Position Control--The position control is a potentiometer across the - and + power supplies. The output from the potentiometer is fed to the pen motor. Stylus position is affected by turning the position control in the desired direction.
3. Attenuator Switch--The attenuator control allows selection of the desired sensitivity and calibration and also isolates the signal conditioner in the OFF position.
4. Vo Adjustment--The Vo adjustment is a screwdriver potentiometer adjustment which compensates for voltage offsets in the TSC-810.

B. Specifications, TSC-810

1. Sensitivity: 10 mv/div., nominal
2. Input Configuration: 500K ohms (± 2%) single-ended, floating.
3. Linearity: ± 1% of full scale (for input voltage up to ± 250 mv)
4. Attenuator Switch
   a. Position: 9 active from 10 mv/div. to 5 V/div.
   b. Ratio Accuracy: ± ½% typical; ± 1% maximum
   c. Other Positions: OFF, CAL

5. Baseline Drift:
   a. 0.2 div./8 hr. typical; 0.5 div./8 hr. maximum
   b. 0.2 div./10°C typical; 0.5 div./10°C maximum
6. Rise Time
   a. TR-888--4 to 5 msec for 5 mm peak to peak stylus deflection
   b. TR-444--4 to 5 msec for 5 mm peak to peak stylus deflection
   c. TR-7100--50 msec for full scale peak to peak stylus deflection
7. Recovery Time
   a. TR-888 20 msec (maximum)
   b. TR-444 20 msec (maximum)
   c. TR-7100 40 msec (maximum)
8. Position Adjustment
   ± 27 Div. (Minimum)
   Note: Mechanical stylus limits are pre-set at factory between ± 26 and ± 27 Div.
9. Vibration: 3 g's at 2 to 100 hz

C. Specifications, TSC-810, with Recorder
1. Linearity: ± ¼ div.
2. Hysteresis: 0.1 div. maximum
3. Frequency Response with 1 ± ½ div. overshoot

   The frequency response of the amplifier/pen motor combination is limited by the mass of the pen motor drive coil and associated stylus and varies for each system application as follows:
   a. TR-888
      1) DC to 30 Hz, 50 div. peak to peak, ± 1 db
      2) DC to 60 Hz, 20 div. peak to peak, ± 1 db
      3) DC to 125 Hz, 10 div. peak to peak, - 3 db
   b. TR-444
      1) DC to 30 Hz, 50 div. peak to peak ± 1 db
      2) DC to 60 Hz, 20 div. peak to peak ± 1 db
      3) DC to 100 Hz, 5 div. peak to peak - 3 db

c. TR-7100

1) DC to 10 Hz, 50 div. peak to peak ± 1 db

2) DC to 18 Hz, 50 div. peak to peak - 3 db

4. Calibration Voltage: set at 200 mv ± ½ mv

a. Accuracy: ± 1% for 6 months

b. Minimum Adjustment: ± 200 mv

5. Power Requirement: 115 V ± 10 V AC 50 Hz or 60 Hz, 6-watts

6. Power Supply (± EBB):

a. Output Voltage: ± 14.1 VDC minimum; ± 16.7 VDC maximum

b. Output Current: 2 ma to 250 ma

c. Output Ripple Voltage:

1) 125 mv RMS maximum at 250 ma load and 105 VAC line

2) 20 mv RMS at 250 ma load and 125 VAC line

3) 20 mv RMS at 2 ma load and 105 VAC line.

d. Load Regulation: 2.5% from 2 ma to 250 ma load change with constant line voltage

e. Line Regulation: 1% change per 10 VAC change in line voltage at constant load

7. Operating Temperature Range: 0° to 50°C ambient

8. Duty Cycle: Continuous for normal operation

9. Life (MTBF): 10,000 hours minimum for normal operating conditions

10. Rise Time

a. TR-888 and TR-444: 4 to 5 msec for 5 mm peak to peak stylus defection

b. TR-7100: 50 msec for full scale peak to peak stylus deflection

11. Recovery Time

a. TR-888 and TR-444: 20 msec (maximum)

b. TR-7100: 40 msec (maximum)

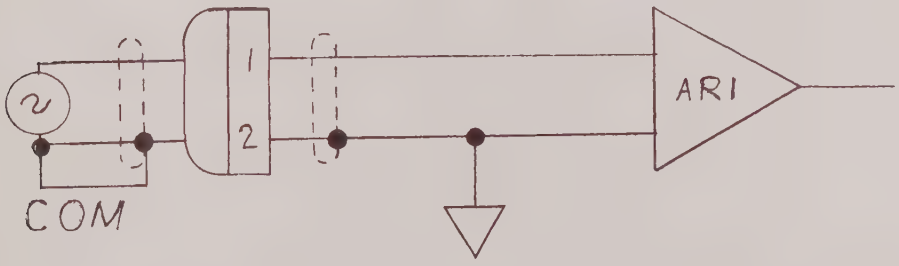
12. Io Offset
    a. 0.1 div. typical
    b. ¼ div. maximum
13. Vo Adjustment: Set to within 0.1 div., (± 3 div. adjustment minimum)
14. Noise:
    a. .1 div. typical
    b. 0.2 div. maximum

II. INSTALLATION

The TSC-810 Signal Conditioner is designed for ease of installation. Hold the unit upright in one hand and carefully insert the PC board edge of the conditioner into the two slides on the recorder. Push the conditioner fully in until the PC board is inserted into the connector and the module is flush with the front panel of the recorder. The conditioner is then properly in place.

A. Signal Wiring Connections

The TSC-810 is a sensitive signal conditioner in respect to its mv sensitivity and must be wired accordingly. Shielded cable should be used from the input connector to the desired source of signal input. The positive side of the signal should be connected to pin 1. The shield should be connected to the signal common at the signal source to prevent any noise from affecting the signal level. Connect the signal source common to a good earth ground, which will generally reduce 60-cycle noise pickup. The signal cable should be 4 to 6 feet long in order to reduce noise pickup.



SIGNAL INPUT CONNECTIONS

III. OPERATION

A. General Procedure

For all Signal Conditioner calibration procedures, set up Basic Recorder controls as follows:

1. Turn MAIN POWER, ON. Allow 15 minutes warmup.
2. Set CHART SPEEDS selector to 1 or 5 mm/sec. or approximate equivalent.
3. Adjust TRACE WIDTH control for a fine trace.
4. Refer to Specific Procedures below.

B. Specific Procedure, Model TSC-810

1. Turn round locking knobs on GAIN and POSITION controls counterclockwise 1/2 to 2/3 turn to unlock controls, then turn each locking knob clockwise until GAIN and POSITION controls are partially restrained from rotating.
2. Turn GAIN control fully counterclockwise.
3. Using POSITION CONTROL, set trace drawn by Recorder Stylus precisely to the center line of its channel.
4. Turn GAIN control fully clockwise; if the Stylus moves from its center position by more than 2/5 of the smallest chart division, reset it to channel center line by means of the screwdriver adjustment Vo trimmer located behind its front panel access hole, marked "Vo".
5. Set Function Switch to CAL (calibrate) position. Set GAIN control to the position which causes the Stylus to trace a line precisely 20 smallest chart divisions to the right of channel center.
   NOTE: 20 divisions are not equivalent to End Scale deflection, which is 25 divisions.

6. Return Function Switch to the OFF position and verify that the Stylus is tracing a line at exactly channel center; correct if necessary by means of the Position control.
7. Repeat steps 5 and 6 until Stylus traces precisely at channel center in OFF and at +20 chart divisions in the CAL position of the Function Switch.
8. The Signal may now be connected to the Signal Conditioner per Wiring Instructions given in Chapter II. The Position control and Function Switch may now be set at any position within their respective ranges of adjustment.

IV. PRINCIPLES OF OPERATION

The Model TSC-810 Signal Conditioner conditions the input signal and controls the stylus in the particular channel that it is used in the recorder. The TSC-810 consists of the following circuitry:

A. Signal Input

The module signal input presents a constant 500 K load to the signal throughout the nine available attenuator positions located on position 3 through 11 of the FUNCTION switch. On the circuit board "side" of the attenuator, the initially conditioned signal, referenced against common, passes through protective resistor R7 to the protective input damping zener diodes CR2 and CR3, which effectively limit the maximum signal voltage seen by input pair Q1 to a safe value in case of a severe accidental overload at the input of the attenuator, in which case the excessive signal voltage would be dropped across R7.

Q1, the input pair, is connected in the now classical Darlington configuration to present a very high (30 to 50 megohms) load to the input attenuator, to keep attenuator loading to a minimum, and to maintain accurate attenuator ratios. Q1 is a single-chip pair, with excellent temperature characteristics. This portion of the circuit, consisting of Q1, R4, R6, R8, and R9 has a voltage gain of unity. The purpose of R9, the front-panel accessible Vo control, is to maintain a zero-input zero-output condition. R4 is a resistor selected to reduce the Io leakage out of the base of the first transistor in Q1 to a level which will cause less than 0.2 divisions of stylus shift when switching the FUNCTION switch through its range, (equivalent to 2 mv at input). The Io is essentially a constant-current flow, and would otherwise produce a false "signal" at the input of Q1 equivalent to the Io current multiplied by the resistive value of the attenuator seen by Q1, which varies between 1 K ohm and 500 K ohms as the FUNCTION switch is rotated through its range.

B. Power Supply

The center-tapped secondary of a power transformer feeds a full-wave bridge rectifier module, CR6, whose output gives a positive and a negative voltage with respect to the transformer center tap (P.C. board common). This unfiltered DC output is smoothed by electrolytic capacitors C1 and C2 and

then passes to the series regulators Q2 and Q3. The positive voltage regulator, consisting of CR5, R11, and Q3 is assembled into the simplest series regulator, closely akin to an emitter follower whose base input voltage and emitter output voltage is set and fixed by zener diode CR5. CR5 is supplied with current through dropping resistor R11 from the unregulated voltage supplying the collector of Q3. CR5 is a 16 volt, 5% zener, rated at one watt. The net output voltage is 16 volts less 0.6 volt emitter-to-base drop in Q3, or 15.4 volts ±5%.

C. Calibration Circuit

The calibration voltage circuit comprises R5, CR1, R1, R2, and R3. Reference zener CR1, a 9-volt unit is connected to the regulated positive voltage supply through R5. This doubly-regulated voltage, available at the junction of R1 and CR5 is fed to a voltage divider string consisting of R1, R3, and trimmmer potentiometer R2. The output of R2, derived from its slider, is adjustable over a narrow range around 200 mv, the nominal calibration voltage. This calibration voltage signal is connected to position number 2 of the FUNCTION switch.

D. Stylus Position Control Circuit

The stylus position control potentiometer is connected between the +15.5 and -15.5 V busses on the PC board and the slider of this control is connected directly to the position input of the integrated amplifier pen motor.

E. Gain Control Circuit

The gain control potentiometer is connected between the output of Q1 and PC board common. Since the sensitivity of the integrated amplifier pen m tor is equal to approximately 8 millivolts per chart division, and since Q1 has a gain of one (1), the rated senstivity of the system (10 millivolts per chart division) is attained when the slider is stationed at approximately 75% of its full scale (270°) rotation. The control slider is connected directly to the signal input lead of the integrated amplifier pen motor.

F. Calibration Adjustment

a. Equipment
   1) Digital Voltmeter ±0.1%
   2) Narrow screwdriver
   3) Extender card

b. Procedure
   1) Plug TSC-810 into the extender card and insert the assembly into the recorder.
   2) Push MAIN POWER ON and allow 15 minutes warm-up time.
   3) Connect the plug (+) lead of the DVM to TP7 and the negative lead to TP10.
   4) Adjust R2 until the DVM is reading 200 (±1) mv.

V. PREVENTIVE MAINTENANCE

A. Periodic Maintenance - Mechanical Check

These TSC checks are generally recommended every 500 hours of operation or every three to six months, as determined by experience. They may also be used for preliminary troubleshooting. See Section 1 Specifications.

1. Preliminary

Turn OFF all power to the recorder. Remove the signal conditioner by grasping the top and bottom black knobs and then pulling the signal conditioner straight out.

2. Cleaning

Blow out dust and dirt with an air hose. Inspect for foreign particles. Clean the preamplifier panel and knobs with a moist cloth, then wipe dry with a soft, dry cloth. Occasionally rotate each knob through its full scale. This keeps all contacts clean.

3. Inspect for Tightness

Inspect the signal conditioner and power supply for loose transistors, plug-in components, resistors, capacitors, controls, terminal boards, mounting boards, rectifiers, fuses, transformers, etc. Check that all panel-mounted components are securely in place, that all locking controls will lock securely, and that each knob is tight on its shaft.

4. Inspect for Damage

Inspect visually and by smell for burned or worn insulation, leakage, or damaged resistors, capacitors, transformers, etc. Inspect also for corrosion, rust, and electrical or mechanical abuse.

5. Replace

Reinstall the equipment and fasten securely.

VI. TROUBLESHOOTING (TSC-810)

SYMPTOMS	CHECK (DWG. 401130)
No Position, No Output	1. Channel fuse 2. Board connection 3. Power supply a. The output of CR6 is approximately 45 VDC; and if not, check CR6, C1 and C2. b. TP8 to TP10 should be +16 VDC; if not, check CR5, R11, and Q3. c. TP9 to TP10 should be -16 VDC; if not, check CR4, R10, and Q2. 4. If problem still persists, check amplifier circuitry for shorts on the TSC-810 and on the recorder.
Position but no Output	1. TP6 to TP3, if no signal, check connections and CR2 and CR3. 2. TP5 to TP10, if no output, check Q1 and associated circuitry. 3. TP2 to TP10, if no signal, check GAIN potentiometer.
Output but no Position	R111 for open
Noise on left side	1. TP9 to TP10 with oscilloscope for AC ripple; if ripple exceeds specifications, check C2 and CR4. 2. Input clamps CR2 and CR3.
Noise on Right side	1. TP8 to TP10 with oscilloscope for AC ripple; if ripple exceeeds specifications, check C1 and CR5. 2. Input clamps CR2 and CR3.
Unable to adjust CAL	CR1, R1, R2, and R3.

VII. PARTS LIST

Parts lists are compiled by assembly or subassembly. They are listed first by reference designation in alphanumeric order and then alphabetically by nomenclature. To the right of each nomenclature or part name is the manufacturer (Gulton or otherwise), manufacturer's part number, and then GULTON part number which every part has. Manufacturer's part name and number are given in the PARTS LIST when available. However, it is sometimes more expedient and less expensive to obtain the part locally. Sometimes a part (such as a resistor, where its value is known) may even be available in the customer's own stock of supplies.

Ref. Desig.	DWG. 401127 DWG. 401130 Description	Techni-Rite Part No.	Mfr.	Mfr. P/N	Units per Ass'y.
C1, C2	Capacitor 530VF	104131	Richey Elec.	-	2
CR1	Diode Ref. 9V	104154	Motorola	IN935	1
CR2,CR3	Diode Zener 7.5V	104679	*	-	2
CR4,CR5	Diode Zener 7.5V	101968-16	*	-	2
CR6	Diode Bridge	106080-2	Motorola	MDA920A-2	1
Q1	Transistor Dual	104468	Sprague	TD601	1
Q2	Transistor PNP	103846	Motorola	2N4919	1
Q3	Transistor NPN	103833	Motorola	2N4922	1
R1	Resistor 51.1K	100549-5112	*	-	1
R2	Potentiometer 500 ohms	103954-501	Beckman Heli.	77PR	1
R3	Resistor 1K	100549-1001	*	-	1
R4	Resistor 300 Meg	101880-307	Res. Prod. Co.	BAEW	1
R5	Resistor 698 ohms	100549-698R	*	-	1
R6	Resistor 49.9 K	100549-4992	*	-	1
R7	Resistor 100 K	100550-1003	*	-	1
R8	Resistor 1 meg	100549-1004	*	-	1
R9	Potentiometer 20 K	103954-203	*	-	1
R10,R11	Resistor 180 ohms	100558-181	*	-	2
	Switch, Rotary	1-103641	Mallory	4M 11111	1
R102	Resistor 150 K	100549-1503	*	-	1
R103	Resistor 49.9 K	100549-4992	*	-	1
R104	Resistor 24.9 K	100549-2492	*	-	1
R105	Resistor 15 K	100549-1502	*	-	1
R106	Rrsostor 4.99 K	100549-4991	*	-	1
R107	Resistor 2.49 K	100549-2491	*	-	1
R108	Resistor 1.5 K	100549-1501	*	-	1
R109	Resistor 1 K	100549-1001	*	-	1
R110, R111	Potentiometer Input Circuit Assembly	102008-503 401127	Clarostat Mfg. -	- -	

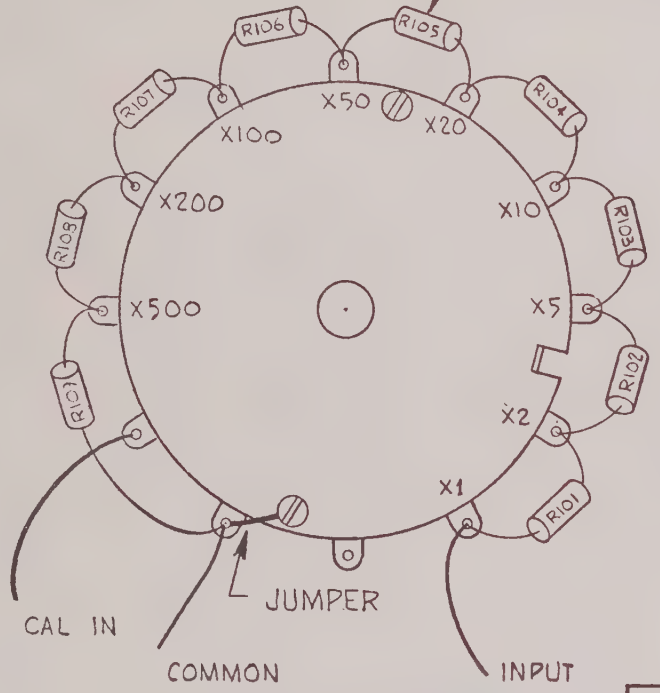
Note: All Resistors Part No. 100549 are 1% ¼ WMF
100550 are 1% ½ WMF
100558 are 5% 1 WCC
101880 are ±10% p.5 WCC

* See your local distributor.

VIII. SCHEMATICS AND ILLUSTRATIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVED
	H	REDRAWN	9-30-61	
		DELETED FIND 2 & N -2 ADD	2-12-73	[illegible]
	J	DELETED FIND 11 SCHEMATIC	6/4/73	[illegible]

NOTE
RESISTORS ARE BETWEEN TERMINALS NOT OUTSIDE.
SEE NOTE 1



NOTE:
1. KEEP DIA. OF ASSY AS SMALL AS POSSIBLE.
2. SET LOCKING WASHER FOR (11) POSITIONS.
3. DRESS ALL RESISTER LEAD WIRES TO MAINTAIN A MINIMUM OF 1/16" CLEARENCE BETWEEN LEADS OF ADJACENT RESISTORS IN EACH LAYER

200751-1
200751-2

FIND	DESCRIPTION	PART NO.	QTY.	
15				
14				
13	JUMPER		X	—
12	SELECTOR POSITION	TT-7 #2		
11				
10	RESISTOR (1K R109	100549-1001	1	1
9	" (1.5K R108)	" -1501	1	1
8	" (2.49K R107)	" -2491	1	1
7	" (4.99K R106)	" -4991	1	1
6	" (15K R105)	" -1502	1	1
5	" (24.9K R104)	" -2492	1	1
4	" (49.9K R103)	" -4992	1	1
3	" (150K R102)	" -1503	1	1
2	" (249K R101)	" -2493	1	—
1	SWITCH ROTARY	1-103641	1	1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES:
TOLERANCES ON:
FRACTIONS ± 1/64 | DECIMALS ±.005 | ANGLES ± 1°

DRAWN BY: C.W. HALL 30 SEP 69
CHECKED BY: H.L. MASTRIE 1 OCT 69

REMOVE ALL BURRS AND SHARP EDGES. DIMENSIONS AND TOLERANCES SHALL BE HELD AFTER PLATING.

MATERIAL: —//—

CONTRACTOR APPROVAL:
DESIGN APPROVAL:
DOCUMENTATION APPROVAL:

401124	TSC-810
	TR 722
NEXT ASSEMBLY	USED ON

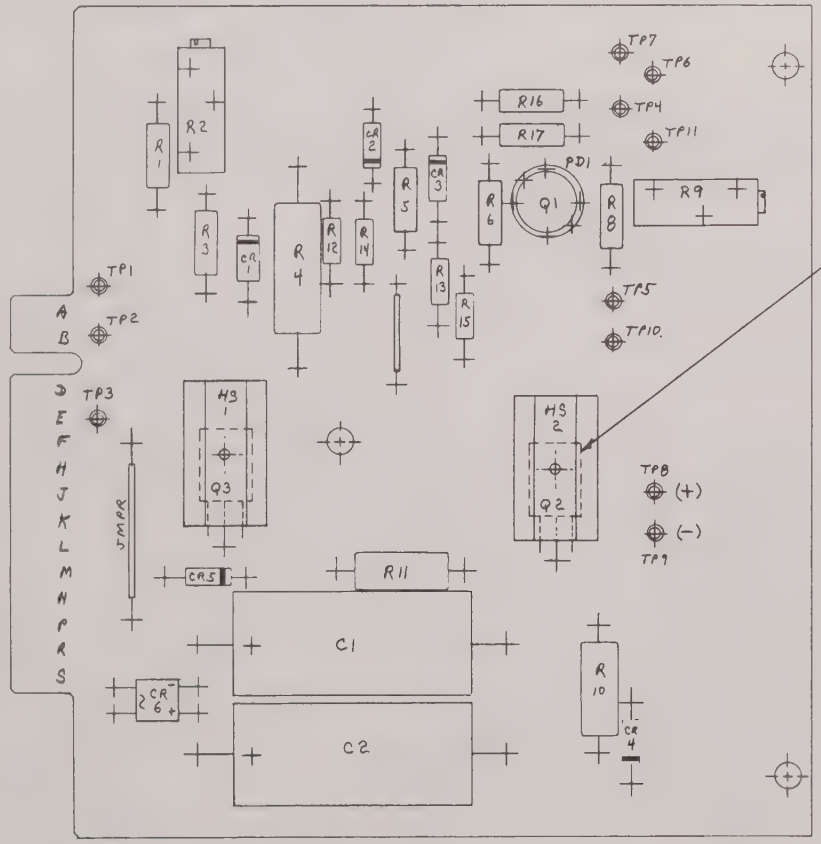
APPLICATION:

ASSY. - ATTENUATOR

SIZE	CODE IDENT NO.	DWG. NO.
B		200751-X

SCALE: [illegible] CONTRACT NO. SHEET 1 OF 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REDRAWN	10-1-69	
	B	FIND #14 WAS 103533	12-29-69	20701
	C	REDRAWN W/CHNGS PER M/P	2-9-23	30340
	D	REVISED	2-16-23	30601
	E	REDRAWN PER MP	6-11-23	30980



NOTES:
1. USE SILICONE GREASE BETWEEN HEATSINK AND TRANSISTORS.
2. BELLEVILLE WASHER (SUPPLIED WITH TRANSISTOR) TO BE USED ON ETCHED SIDE OF BOARD.
* 3. R4 TO BE SELECTED BY TEST TO REDUCE EXCESSIVE I, SHIFT

		27		
		26		
		25		
CR6	1	24	106080-2	RECTIFIER, BRIDGE
~	1	23	401130	SCHEMATIC
~	1	22	401129	PC BOARD
HS1,2	2	21	104613-1	HEAT SINK
PD1	1	20	104305	PAD, TRANSISTOR
Q3	1	19	103833	TRANSISTOR, NPN 2N4922
Q2	1	18	103846	TRANSISTOR, PNP 2N4919
Q1	1	17	104468	TRANSISTOR, DUAL TD601
CR2,3	2	16	2-101971	DIODE, SIG. 1N457
CR4,5	2	15	106696-16	DIODE, ZENER ½ W
CR1	1	14	104[illegible]4	DIODE, ZENER 9V
C1,2	2	13	104131	CAPACITOR, AXIAL, 25V 53μF
R10,11	2	12	100558-181	RESISTOR, 1W, CC, 5% 180Ω
R12-15	4	11	100556-512	RESISTOR, ¼W, CC, 5% 5.1K
R4 *	1	10	101880-X	RESISTOR, CARBON F
R9	1	9	103954-203	POTENTIOMETER 20K
R2	1	8	" -501	" 500Ω
R17	1	7	100549-2493	RESISTOR, ¼W MF 1% 249K
R16	1	6	" -1003	" " " 100K
R8	1	5	" -1004	" " " " 1MEG
R6	1	4	" -4992	" " " " 49.9K
R5	1	3	" -698R	" " " " 698Ω
R3	1	2	" -1001	" " " " 1K
R1	1	1	" -5112	" " " " 5.1K

DWG SIZE	CODE IDENT	SPECIFICATIONS		QUAN REQ	FIND NO.	PART NO. OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES:
TOLERANCES ON:
FRACTIONS ± 1/64 | TWO PLACE DECIMALS ± .010
ANGLES ± 1° | THREE PLACE DECIMALS ± .005
REMOVE ALL BURRS AND SHARP EDGES. DIMENSIONS AND TOLERANCES SHALL BE HELD AFTER PLATING. MACHINE SURFACES TO BE 63 RMS.
MATERIAL ~

DRAWN BY: A. SUTTON DATE 6-11-73
CHECKED BY:
CONTRACTOR CERTIFICATION:
DESIGN APPROVAL:
DOCUMENTATION APPROVAL:

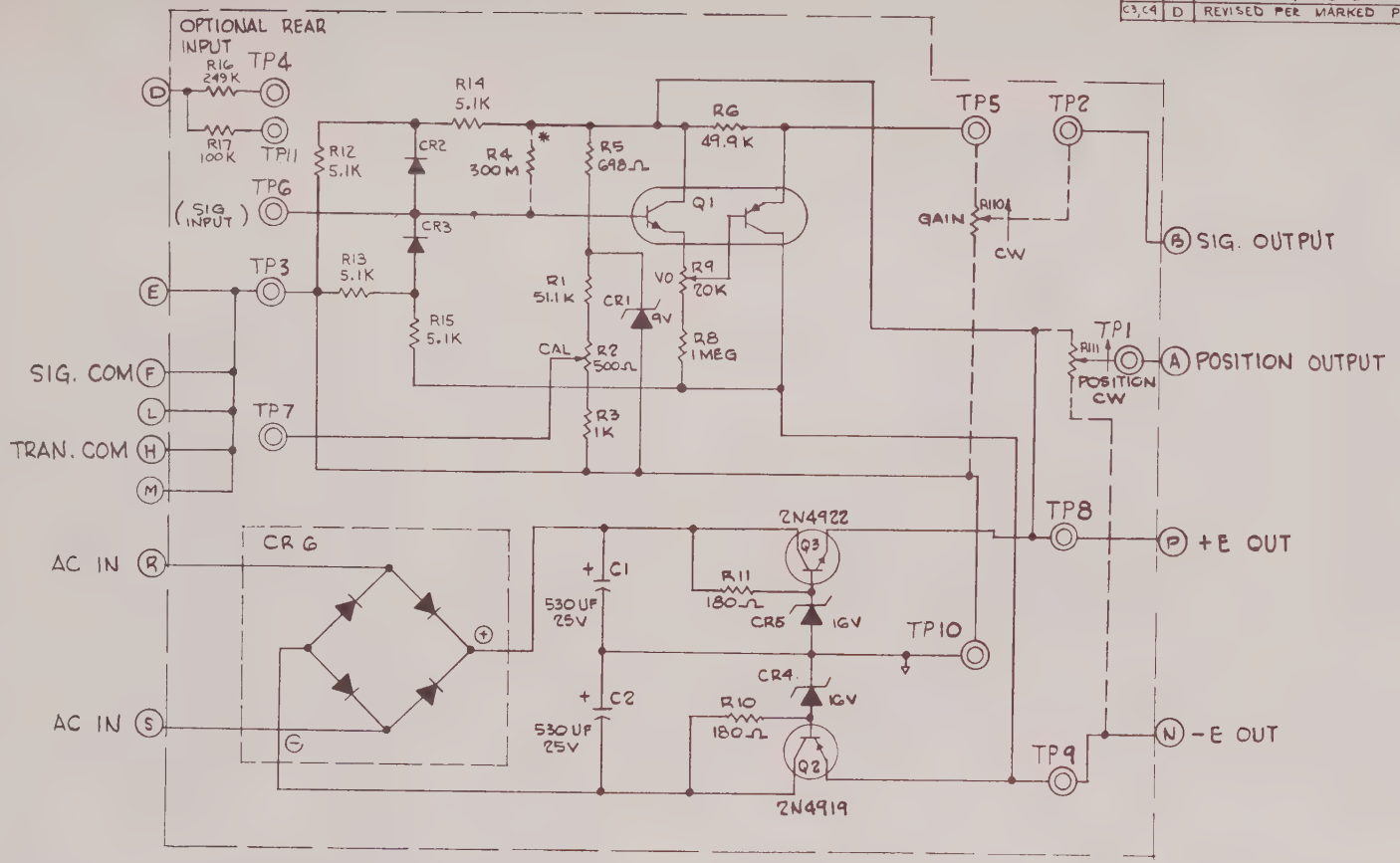
P.C. ASSEMBLY

SIZE	CODE IDENT	DWG NO
C		401127

SCALE	CONTRACT NO.	SHEET
2:1		1 OF 1

DWG SIZE	NEXT ASSY	USED ON
	401133	TSC-810
	APPLICATION	

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REDRAWN	9-31-69	
	B	CHANGED CR5 TO CR4 & CR4 TO CR5 FMR	23JAN70	20442
	C	ADDED R111 & R110 DESIGNATIONS P.A.L.	1 MAY 70	20171
C3,C9	D	REVISED PER MARKED PRINTS ACK	2-8-73	30340



* SELECTED AT TEST WHEN NECESSARY

IO SHIFT	R4 (CARBON FILM OR COMPOSITION
2 TO 4 mv	600 MEG. OHM
4 TO 6 mv	300 MEG OHM
6 TO 8 mv	250 MEG OHM
8 TO 10 mv	200 MEG. OHM
10 TO 12 mv	180 MEG. OHM

DWG SIZE	CODE IDENT	SPECIFICATIONS		QUAN REQ	FIND NO.	PART NO. OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
						PARTS LIST	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON:
FRACTIONS ± 1/64 | TWO PLACE DECIMALS ± .010
ANGLES ± 1° | THREE PLACE DECIMALS ± .005
REMOVE ALL BURRS AND SHARP EDGES. DIMENSIONS AND TOLERANCES SHALL BE HELD AFTER PLATING. 63 MACHINE SURFACES TO BE √ RMS.
MATERIAL

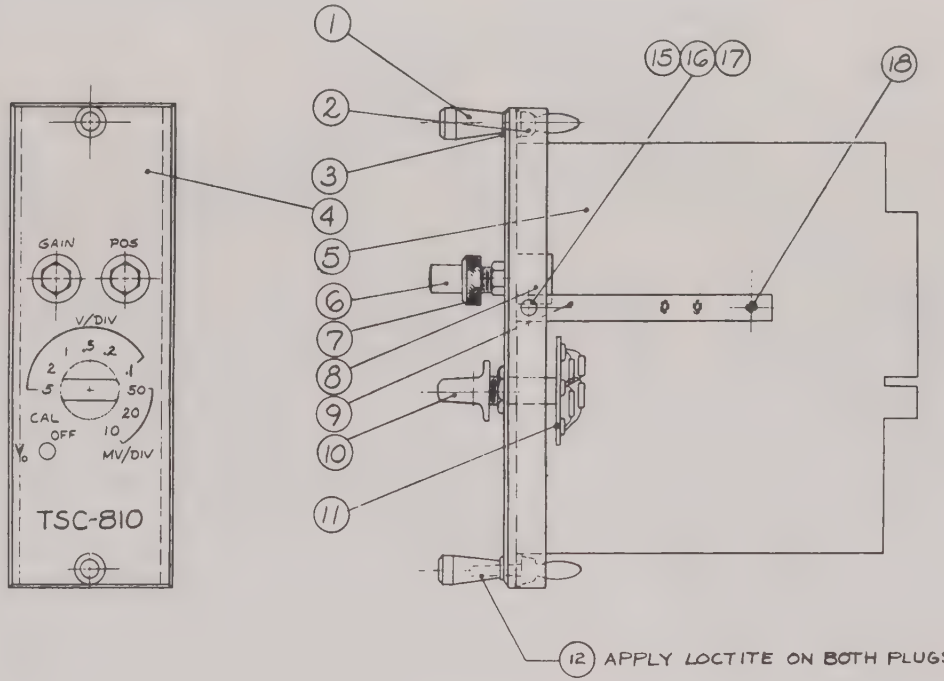
DRAWN BY: N.WATSON DATE 9-31-69
CHECKED BY: J.F. CAYER 10CT69
CONTRACTOR CERTIFICATION:
DESIGN APPROVAL:
DOCUMENTATION APPROVAL:

SCHEMATIC, INPUT CIRCUIT

SIZE C | CODE IDENT | DWG NO. 401130
SCALE — | CONTRACT NO. | SHEET 1 OF 1

DWG SIZE	NEXT ASSY	USED ON
C	401134	TSC-810
	APPLICATION	

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	REDRAWN	9 JUL 69	
	D	ADDED FIND 20	9/2/71	
	E	FIND 4 WAS A-401095 IDR	9-9-7	



NOTE:
MODULE TO BE ALIGNED IN FIXTURE FOR PROPER FIT IN RECORDER

QUAN REQ.	FIND NO.	PART NO. OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
1	20	401945	Cables TSC-810 Amp
X	19	401132	Schematic
1	18	#4-40 x 1/4	RD. HD Screw-Phillips
4	17	#4-40	Lockwasher
4	16	#4-40	Hex Nut
3	15	#4-40 x 1/4	Fl. Hd. Screw - Phillips
	14		
	13		
X	12		Loctite Brg. Ser. Kit # 113
1	11	200751-2	Atten. Ass'y
1	10	103575	Knob
1	9	104681	Strap
2	8	107148-503	Potentiometer
2	7	102024	Shaft Lock
2	6	102023	Knob
1	5	401127	Input Circuit Ass'y.
1	4	B-401095	Front Panel
2	3	104706	Nylon Washer
2	2	104707	Banana Plug
2	1	104705	Knob - Module

PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON:
FRACTIONS ± 1/64 | TWO PLACE DECIMALS ± .010
ANGLES ± 1° | THREE PLACE DECIMALS ± .005
REMOVE ALL BURRS AND SHARP EDGES. DIMENSIONS AND TOLERANCES SHALL BE HELD AFTER PLATING. 63 MACHINE SURFACES TO BE √ RMS.
MATERIAL

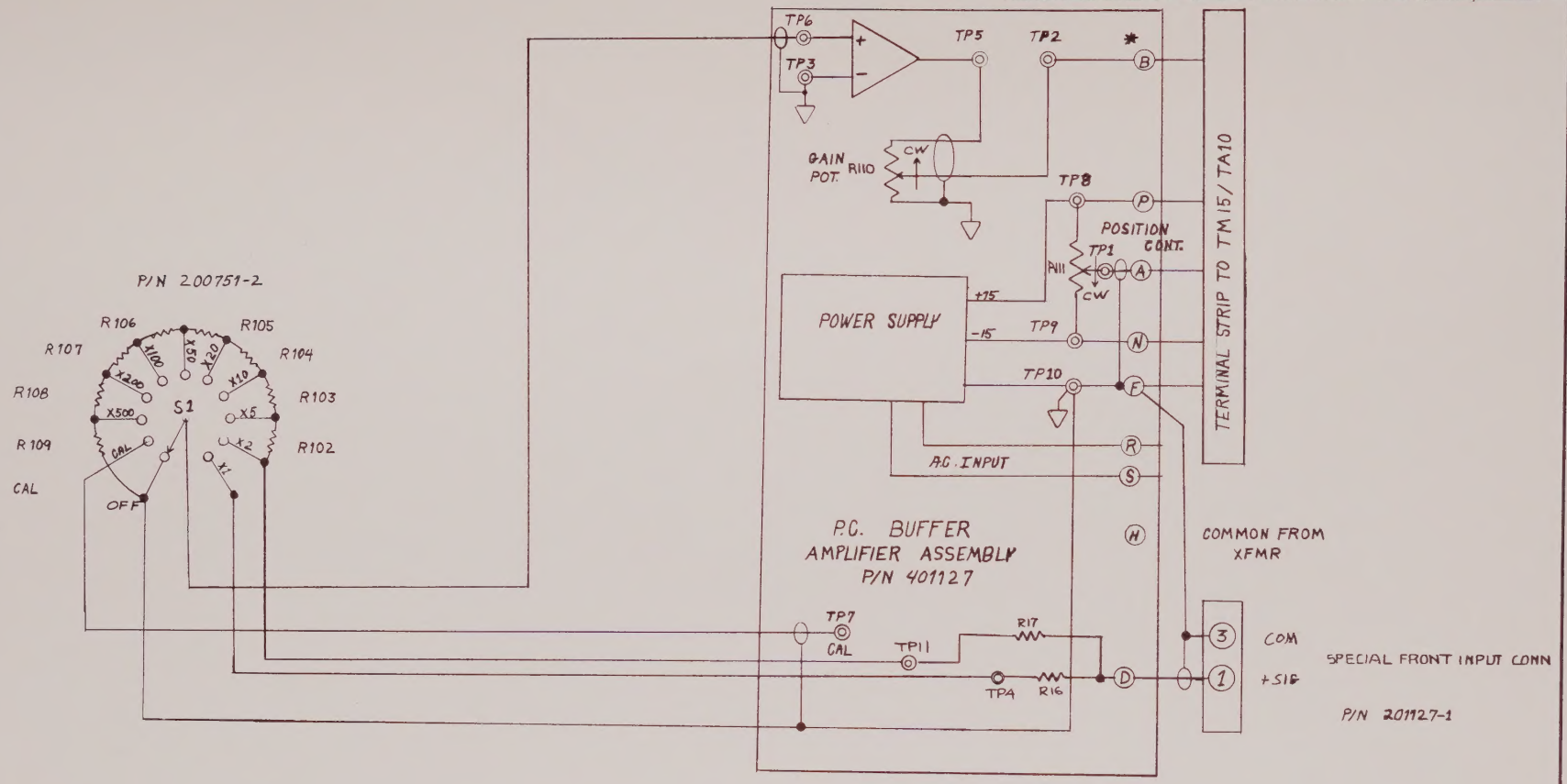
DRAWN BY: R W UPTON DATE 31SEP69
CHECKED BY: J. F. CAYER OCT69
CONTRACTOR CERTIFICATION:
DESIGN APPROVAL:
DOCUMENTATION APPROVAL:

ASS'Y - INPUT CIRCUIT MODULE (TSC-810)

SIZE C | CODE IDENT | DWG NO. 401134
SCALE | CONTRACT NO. | SHEET 1 OF 1

DWG SIZE	NEXT ASSY	USED ON
E	600900	TR-888
	APPLICATION	

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REDRAWN	11/18/69	
	B	ADDED R110 & R111 DESIGNATIONS P.A.L.	5/1/70	20171
	C	DELETED R101; ADDED WIRE X2 to TP11 OCR	2-12-77	30340
	D	PER DCR.	1-19-79	31846



* CORRESPONDING TO P.C. CONNECTOR PIN

BUFFER AMPLIFIER MODULE SCHEMATIC

DWG SIZE	CODE IDENT	SPECIFICATIONS		QUAN REQ	FIND NO.	PART NO. OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
							PARTS LIST

C	401134	TSC 810
DWG SIZE	NEXT ASSY	USED ON
	APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON:
FRACTIONS ± 1/64 | TWO PLACE DECIMALS ± .010
ANGLES ± 1° | THREE PLACE DECIMALS ± .005
REMOVE ALL BURRS AND SHARP EDGES. DIMENSIONS AND TOLERANCES SHALL BE HELD AFTER PLATING. 63 MACHINE SURFACES TO BE √ RMS.
MATERIAL

DRAWN BY: W. GARIEPY DATE 11/18/69
CHECKED BY: T. Yip
CONTRACTOR CERTIFICATION:
DESIGN APPROVAL:
DOCUMENTATION APPROVAL:

SCHEMATIC, BUFFER AMPLIFIER MODULE TSC 810

SIZE	CODE IDENT	DWG NO.
C		401132

SCALE	CONTRACT NO.	SHEET
		1 OF 1

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Measurement & Control Systems Division
Gulton Industries Inc, East Greenwich, Rhode Island 02818
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